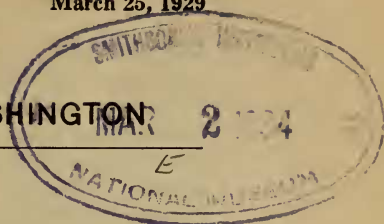


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## SIX NEW POCKET MICE FROM LOWER CALIFORNIA AND NOTES ON THE STATUS OF SEVERAL DESCRIBED SPECIES.

BY E. W. NELSON AND E. A. GOLDMAN.

Study of recent collections made in Lower California by the Museum of Vertebrate Zoology of the University of California, the California Academy of sciences, the San Diego Society of Natural History, and the Los Angeles Museum has added materially to knowledge of the mammals of the peninsula and adjacent islands. These collections supplement in a substantial way those made by the writers in an overland journey through the peninsula more than 20 years ago, and combined with them, and with specimens already available from other sources, afford a more satisfactory basis for a general report, now in course of preparation, on the mammals of the region. The following treatment of some of the pocket mice is published in advance in order that information may be made promptly available to other workers. For the use of critical material, including in several instances the types upon which new subspecies are based, we are indebted to Dr. Joseph Grinnell, Museum of Vertebrate Zoology, University of California, Dr. Barton W. Evermann, California Academy of Sciences, Mr. Laurence M. Huey, San Diego Society of Natural History, and Dr. Wilfred H. Osgood, Field Museum of Natural History.

Status of *Perognathus bombycinus* Osgood.

*Perognathus bombycinus* Osgood, from Yuma, Arizona, has been regarded as a species distinct from *Perognathus longimembris*, which in its various forms occupies extensive territory in California, Lower California, Nevada, and Utah. In the original description (Proc. Biol. Soc. Washington, vol. 20, February 23, 1907, p. 19) the relatively large, fully expanded

mastoids and very narrow interparietal were regarded as specific characters. Study of additional material now available shows considerable variation in members of the *P. longimembris* group, in the development of the mastoids, in the extent to which they project posteriorly beyond the plane of the occiput, and in their relation to the interparietal and supraoccipital. In typical *longimembris*, for example, the mastoids are comparatively small with slight posterior projection beyond the occiput, and the interparietal and supraoccipital are moderately wide; in *P. l. bangsi* the mastoids are more swollen and somewhat variable in extent of posterior projection, the interparietal and supraoccipital, while variable within certain limits, remain essentially as in *longimembris*; from *P. l. bangsi* it is only a short step to the form described as *P. bombycinus*, with still more swollen, more posteriorly projecting mastoids, crowding inward at the expense of the interparietal and supraoccipital. *P. l. panamintinus* and *P. l. aestivus* are geographic races presenting varying combinations of the same cranial features. The systematic position of *bombycinus* as one of the several subspecies of *longimembris* (*Perognathus longimembris bombycinus*) is clearly indicated.

#### Status of *Perognathus formosus* Merriam.

*Perognathus formosus* Merriam (North Amer. Fauna No. 1, October 25, 1889, p. 17) originally described from St. George, Utah, was accorded a range by Osgood (North Amer. Fauna, No. 18, September 20, 1900, p. 41), in his revision of the genus, extending from southwestern Utah, across southern Nevada into adjacent parts of California. Subsequent collections from southeastern California and from Lower California have, however, added materially to the known ranges of forms assignable to the species. As in many other instances the Colorado River appears to form a barrier to the distribution of this species which has been taken near its northern and western bank, but never on the other side. Elliott (Field Columb. Mus., publ. 87, Zool. ser., vol. 3, December, 1903, p. 251) in describing *Perognathus mesembrinus* from Palm Springs, Riverside County, California recognized relationship to *Perognathus formosus*, but the animal was given specific rank. Study of numerous specimens now available, including large series from various localities, shows intergradation between typical *formosus* and *mesembrinus* which is, however, usually distinguished by smaller size, paler coloration and cranial details, especially the attenuation of the rostrum. The subspecies *mesembrinus* occupies the Colorado Desert region extending south from the San Bernardino Mountains and east to the Colorado River, California, as shown by specimens from Palm Springs (type locality), Riverside County, Vallecito and La Puerta, San Diego County, and Pot Holes and Pilot Knob near the Colorado River, Imperial County. Specimens from along the Colorado River on the California side nearly opposite Ehrenberg, Arizona, and localities north as far as Chemehuevis Valley are variable, some being as pale as typical *mesembrinus*, while others are rather dark and in cranial characters approach *formosus*. In the sum of characters presented, with due allowance

for individual variation, they seem more properly referable to *mesembrinus* which evidently merges with *formosus* in the Mohave Desert region.

The recent Museum of Vertebrate Zoology collection from Lower California extends the known range of *Perognathus formosus* to the western shore of the Gulf of California where it is represented by a new geographic race described below.

***Perognathus formosus cinerascens*, subsp. nov.**

ASHY POCKET MOUSE.

*Type*.—From San Felipe, northeastern Lower California, Mexico. No. 37685, ♀ (in adult pelage but molars unworn), Museum of Vertebrate Zoology, University of California, collected by Chester C. Lamb, April 10, 1926. Original number 5772.

*General characters*.—A small, extremely pallid subspecies closely allied to *Perognathus formosus mesembrinus*, but distinguished by ashy gray coloration of upperparts, with scarcely a trace of the dull buffy brownish suffusion present in *mesembrinus*. Similar in general to *P. f. formosus*, but decidedly smaller and differing otherwise as from *mesembrinus*.

*Color*.—*Type*: Upper parts in general light ashy gray, finely and rather inconspicuously mixed with black owing to overlying black-tipped hairs which are most numerous along median line on head and over back; under parts, including lips, lower part of cheeks, entire fore limbs and hind feet white; tail light brownish above, becoming darker toward tip; white below. *Young* (in first pelage): Upper parts nearly uniform plain ashy gray of a lighter tone than in *P. f. formosus* or *P. f. mesembrinus* of corresponding age.

*Skull*.—Very similar to that of *P. f. mesembrinus*, but still smaller, the rostrum and nasals very slender and the interorbital region apparently narrower. Compared with that of *P. f. formosus* the skull differs strikingly in size, especially the reduction in width of rostrum.

*Measurements*.—*Type*: Greatest length, 155 mm.; tail vertebrae, 75; hind foot, 22.8. A female topotype with molars somewhat worn, and with 7 embryos, but pelage indicating immaturity, 175; 82; 22.7. *Skull* (female of which external measurements are given): Greatest length, 24.3; greatest mastoid breadth, 13.6; interorbital breadth, 6.1; length of nasals, 9.3; width of nasals (in front of incisors), 2.2; interparietal, 5 x 3.5; maxillary toothrow, 3.4.

*Remarks*.—Various species of rodents inhabiting the region including San Felipe along the northwestern desert shore of the Gulf of California, representing such differing families as the Heteromyidae and the Cricetidae are distinguished by extremely pallid coloration. In fact most of the mammals of the region are very light in color, and the subspecies here described accords with the general rule. It is a region of extreme aridity and continued intense sunshine. As the soil is of light color, even where the land surface is not covered with whitish drifting sand, the pale color of the mammals is undoubtedly due to environmental influences. *Perognathus f. cinerascens*, presents extreme development in the direction of pallor

in the species. It probably intergrades with *P. f. mesembrinus* in the imperfectly known desert section extending north, between the mountains on the west and the Gulf and Colorado River on the east, into California. This subspecies is based upon five specimens all from the type locality.

The forms of *Perognathus formosus*, with type localities, will stand sub-specifically as follows:

<i>Perognathus formosus formosus</i> Merriam.....	St. George, Utah.
<i>Perognathus formosus mesembrinus</i> Elliot.....	Palm Springs, California.
<i>Perognathus formosus cinerascens</i> Nelson and Goldman.....	San Felipe, Lower California.

***Perognathus baileyi hueyi*,<sup>1</sup> subsp. nov.**

HUEY POCKET MOUSE.

*Type*.—From San Felipe, northeastern Lower California, Mexico. No. 5220, ♀ young adult (permanent premolars in place but very slightly worn), San Diego Society of Natural History, collected by Laurence M. Huey, April 17, 1926.

*General characters*.—Similar to *Perognathus baileyi baileyi* and *P. b. rudinoris*, but general color of upper parts decidedly paler, more ashy, the dusky element less developed than in either; cranial details slightly different.

*Color*.—*Type*: General tone of upper parts ashy gray with a light buffy suffusion, the head and dorsal area finely and rather inconspicuously lined with black; a faint buffy lateral line present; under parts, fore limbs and hind feet white; ears scantily clothed with fine whitish hairs, the epidermis light in color; tail light brownish above, white below.

*Skull*.—Closely resembling that of *P. b. rudinoris* but mastoid and auditory bullae larger, as in *P. b. baileyi*. Differing from that of *P. b. baileyi* in narrower rostrum, greater posterior extension of premaxillae beyond nasals, and in slenderness of ascending branches of supraoccipital.

*Measurements*.—*Type*: Total length, 196; tail vertebrae, 106; hind foot, 24. *Skull* (type): Greatest length, 27.5; greatest mastoid breadth, 14.3; zygomatic breadth, 14.5; interorbital breadth, 6.4; length of nasals, 10.5; width of nasals (in front of incisors), 2.5; interparietal, 5.7 x 4.4; maxillary toothrow, 3.7.

*Remarks*.—The discovery of this subspecies in the desert region of northeastern Lower California tends to fill the wide gap that formerly existed between the known ranges of *Perognathus baileyi baileyi* and *P. b. rudinoris*. Additional field work may reveal its presence in southeastern California. Like various other forms of the type region this subspecies is distinguished by extremely pale coloration. Although the type is scarcely mature, as indicated by lack of wear on the molars, the condition of the mammae shows that young had been suckled.

*Specimens examined*.—Total number, 9, all from Lower California, as

<sup>1</sup>Named for the collector, Mr. Laurence M. Huey, whose work in the field and in the museum is resulting in important extensions of our knowledge of the mammals of southern California and northern Lower California.

follows: El Mayor, 2; El Mayor (13 miles north), 1; San Felipe (type locality), 6.

Relation of *Perognathus penicillatus* Woodhouse to  
*Perognathus arenarius* Merriam.

Until recently *Perognathus penicillatus*, originally described from San Francisco Mountain, Arizona, was assumed to include in its wide range as a species practically the entire length of the peninsula of Lower California and several adjacent islands, as shown by the assignment to it of *Perognathus penicillatus ammophilus* from Margarita Island and *Perognathus penicillatus siccus* from Ceralbo Island by Osgood (Proc. Biol. Soc. Washington, vol. 20, February 23, 1907, p. 20) and of *Perognathus penicillatus albulus* by Nelson and Goldman (Proc. Biol. Soc. Washington, vol. 36, May 1, 1923, p. 159). While *Perognathus arenarius* was not formally reduced to subspecific rank Osgood and Nelson and Goldman (l. c.) regarded it as one of the intergrading forms of *P. penicillatus*, owing to remarkable general resemblances including size and color which in some forms mark true differential characters, and to the fact that none of the races of *penicillatus* and *arenarius* had ever been collected at the same locality. Field work by Laurence M. Huey and his published results (Proc. Biol. Soc. Washington, vol. 39, July 30, 1926, pp. 67-70), however, directed attention to the specific distinction of the two, representatives of both of which (*Perognathus penicillatus angustirostris* and *Perognathus arenarius albescens*) were taken by him at San Felipe, Lower California. At San Felipe *penicillatus* and *arenarius* as species are easily separated by marked differences in size and color which alone, as observed elsewhere, are not reliable specific characters, but correlated with certain cranial details reveal the true status of the two. Specific characters distinguishing *arenarius* from *penicillatus* are the following: Skull less flattened, the braincase more inflated and and higher arched; upper part of foramen magnum normally forming a distinct embayment, constricted by projecting lateral angles of the margin (foramen magnum more evenly rounded in *penicillatus*); coronoid process more slender and curving strongly backward, not rising so steeply or so high above level of condyle as usual in *penicillatus*. Huey (l. c.) properly allocated *ammophilus*, *albulus*, and *helleri* as subspecies of *arenarius*. To the same species should be transferred the animal originally described as *Perognathus penicillatus siccus*. The subspecies of *P. arenarius*, with two new geographic races which are characterized beyond, with their type localities should stand as follows:

- Perognathus arenarius arenarius* Merriam.....  
San Jorge, near Comondu, Lower California, Mexico.
- Perognathus arenarius albescens* Huey.....  
San Felipe, Lower California, Mexico.
- Perognathus arenarius helleri* Elliot.....  
San Quintin, Lower California, Mexico.
- Perognathus arenarius ammophilus* Osgood.....  
Margarita Island, Lower California, Mexico.

<i>Perognathus arenarius siccus</i> Osgood.....	Cerralbo Island, Lower California, Mexico.
<i>Perognathus arenarius albulus</i> Nelson and Goldman.....	Magdalena Island, Lower California, Mexico.
<i>Perognathus arenarius subucidus</i> subsp. nov.....	La Paz, Lower California, Mexico.
<i>Perognathus arenarius ambiguus</i> subsp. nov.....	Yubay, Lower California, Mexico.

***Perognathus arenarius ambiguus*, subsp. nov.**

## YUBAY POCKET MOUSE.

*Type*.—From Yubay, 30 miles southeast of Calamahue, Lower California, Mexico (altitude 2,000 feet). No. 140011, ♂ young adult (molars slightly worn), U. S. National Museum (Biological Survey collection), collected by E. W. Nelson and E. A. Goldman, September 18, 1905. Original number 18141.

*General characters*.—Similar to *Perognathus arenarius arenarius*, but smaller and paler colored. Slightly larger than *P. a. helleri* with decidedly paler coloration. Rather closely resembling *P. a. albescens*, but color usually distinctly darker. Buffy lateral line absent or faint. Skull presenting slight average differences when compared with those of the neighboring forms mentioned.

*Color*.—*Type*: Upper parts light buff (Ridgway, 1912), obscured by overlying black-tipped hairs; buffy lateral line absent; under parts, forelimbs and hind feet white; tail brownish above, white below.

*Skull*.—Similar in general to that of *P. a. arenarius* and *P. a. albescens* but usually smaller, with relatively smaller mastoid and audital bullae, these differences most noticeable in comparison with *arenarius*. Differing from that of *P. a. helleri* mainly in larger average size.

*Measurements*.—*Type*: Total length, 150 mm.; tail vertebrae, 88; hind foot, 22. Average and extremes of 5 adults from San Andres: 163 (157–167); 92 (88–96); 22 (22–23.5). *Skull* (type): Greatest length, 22.6; greatest breadth, 12; interorbital breadth, 6.2; length of nasals, 8.3; width of nasals (in front of incisors), 2.3; interparietal, 5.8 x 2.8; maxillary tooth-row, 3.2.

*Remarks*.—The forms of *Perognathus arenarius* present a wide range of local variation in color of upper parts evidently associated with the prevailing color tone of the habitat. Pallid individuals inhabit areas of whitish sand or very light-colored soil, and darker ones are found in blackish lava or other soils that are dark in general hue. This subspecies occupies the central section from San Fernando south to the Vizcaino Desert, the region of perhaps most extreme aridity in Lower California. It embraces material somewhat variable in color and cranial details from numerous localities and not satisfactorily assignable to forms heretofore described. Specimens from San Fernando approach *P. a. helleri*, the dark form of the northwest coast of the Peninsula, in rather dark upper parts and tendency, to exhibit a buffy lateral line present in that form. Some of those from San Francisquito and from certain localities as far south as the Vizcaino

Desert, 20 miles west of San Ignacio, are rather pale and in this character not widely different from *P. a. albescens* from San Felipe, Gulf of California, but cranial details, especially the smaller mastoids, are usually distinctive. Most of the specimens from the extensive area assigned to *P. a. ambiguus* possess a medium depth of color combined with slight average cranial details which are fairly distinctive.

*Specimens examined*.—Total number, 58, all from localities in Lower California as follows: Calamahue, 3; Calamahue Canyon (mouth), 7; La Lomita Maria, 4; Pozo Altamirano, 2; Pozo San Augustin (20 miles east of San Fernando), 11; Punta Prieta, 1; Rancho Mesquital (33 miles west of Calmalli), 2; San Andres, 7; San Fernando, 5; San Ignacio (20 miles west), 4; Santo Domingo, 3; San Francisquito, 6; Santa Clara Mountains, 1; Santa Rosalia Bay, 3; Scammon's Lagoon (south side), 4; Turtle (or San Bartolome) Bay, 1; Yubay (type locality), 1.

***Perognathus arenarius sublucidus*, subsp. nov.**

LA PAZ POCKET MOUSE.

*Type*.—From La Paz, Lower California, Mexico. No. 146896, ♂ adult, U. S. National Museum (Biological Survey collection), collected by E. W. Nelson and E. A. Goldman, February 16, 1906. Original number 19146.

*General characters*.—Closely allied to *Perognathus arenarius albulus* but darker in color, the general tone of upper parts tending toward ochraceous-tawny instead of light ochraceous-buff (Ridgway 1912), reaching well down over face along sides and over hips (in *albulus* the pure white of under parts tends to spread upward over face to include orbits, along lower part of sides, and over hips). Similar in general to *Perognathus arenarius arenarius*, but averaging smaller and decidedly paler, the upper parts much less heavily overlaid with black; skull differing in detail.

*Color*.—*Type*: Upper parts near light ochraceous-tawny, finely and inconspicuously overlaid with brownish black; buffy lateral line absent; under parts, entire forearms and hind feet white; tail scantily haired, light brownish above, whitish below.

*Skull*.—About as in *P. a. albulus*, of Magdalena Island. Compared with that of *P. a. arenarius*, the skull averages smaller, and relatively narrower with relatively smaller, less inflated mastoid and audital bullae.

*Measurements*.—*Type*: Total length, 167 mm.; tail vertebrae, 95; hind foot, 22. Averages and extremes of 10 adult topotypes: 157 (151–166); 87.7 (83–95); 21.6 (21–22). *Skull* (type): Greatest length, 24.8; greatest breadth, 12.6; interorbital breadth, 6.3; length of nasals, 9.4; width of nasals (in front of incisors), 2.3; interparietal, 6.4 x 3.7; maxillary toothrow, 3.2.

*Remarks*.—This subspecies has an unusually limited but well defined range, covering the very arid desert of the small sloping basin a few miles in extent, lying about the southern and southwestern part of La Paz Bay. To the north and south its range is limited by mountainous areas and to the west by the divide between the drainage to the Gulf and to the Pacific.

*Specimens examined*.—Seventeen, all from the type locality.

**Perognathus fallax inopinus**, subsp. nov.

## TURTLE BAY POCKET MOUSE.

*Type*.—From Turtle (also known as San Bartolome) Bay, Lower California, Mexico. No. 81059, ♂ adult, U. S. National Museum (Biological Survey collection), collected by A. W. Anthony, August 1, 1896. Original number, 82.

*General characters*.—Closely allied to *Perognathus fallax fallax* and *P. f. pallidus*, but smaller and upper parts more rufescent than usual in either; skull differing in smaller size and structural details. Similar in general to *P. anthonyi*, of Cedros Island, but more ruddy in color and cranial characters quite distinctive. Rump spines present as usual in the species.

*Color*.—*Type*: Lighter element in upper parts near ochraceous-buff, of Ridgway, but slightly more tawny, this color purest along lateral line, but much obscured on head and back by overlying black-tipped hairs, the combination producing a brownish tawny effect; under parts and feet white; outer sides of forearms faintly tinged with buff; tail blackish above, white below.

*Skull*.—Similar to those of *P. f. fallax* and *P. f. pallidus*, but smaller, less massive; rostrum relatively more slender; dentition lighter; incisors narrower; molariform toothrows relatively shorter; audital bullae relatively rather large. Compared with that of *P. anthonyi* the skull is broader posteriorly, with zygomata narrower, more convergent anteriorly, the sides, therefore, less nearly parallel; interorbital space broader; interparietal larger; audital bullae larger, more inflated.

*Measurements*.—*Type*: Total length, 180 mm.; tail vertebrae, 104; hind foot (dry skin), 23. *Skull* (type): Greatest length, 25.5; greatest mastoid breadth, 13.2; interorbital breadth, 6.2; length of nasals (median line), 9.3; width of nasals (in front of incisors), 2.5; interparietal, 6.6 x 4.3; maxillary tooththrow, 3.5.

*Remarks*.—The known range of *Perognathus fallax* as a species lies south from the region of the type locality near San Bernardino, California, along the Pacific slope to Turtle or San Bartolome Bay, Lower California. Rather irregular geographic and individual variation in size and color is notable, but a pale geographic race *P. f. pallidus*, with a range apparently paralleling that of the typical form along the eastern side is recognizable. Specimens from turtle Bay were assigned by Osgood (North Amer. Fauna, no. 18, p. 56, September 20, 1900) to *fallax*, the only form then recognized, and he compared them in color with *P. anthonyi* of Cedros Island then represented by the type only. Study of material now available, including topotypes of *P. anthonyi* and collections from various localities within the general range of *P. fallax* indicate the desirability of recognizing the southern subspecies here described. It is represented by two specimens, both from the type locality.



*Perognathus evermanni*,<sup>1</sup> sp. nov.

EVERMANN POCKET MOUSE.

*Type*.—From Mejia Island (near north end of Angel de la Guardia Island), Lower California, Mexico. No. 3937, ♂ adult, California Academy of Sciences, collected by V. W. Owen, June 28, 1921. Original number, 24.

*General characters*.—A small species of the *Perognathus spinatus* group, resembling typical *spinatus* externally but underlying plumbeous area of pelage darker and more sharply defined; delicate structure of cranium, especially attenuation of nasals and narrowness of frontal and parietal regions, quite distinctive. Rump bristles present, and tail with an elongated terminal tuft as in *spinatus*.

*Color*.—*Type* (in worn pelage): Upper parts light ochraceous buff, darkened by overlying black tipped hairs with sharply defined plumbeous under color showing through, the result being a dull, grizzled, grayish brown general tone; under parts, forelimbs, and hind feet white; tail brownish above, white below.

*Skull*.—Similar in general to that of *P. s. spinatus*, but smaller, relatively narrower, and lighter in structure; braincase narrower and proportionately more arched above, nasals much narrower, more tapering, their width near posterior ends exceeded by that of ascending branches of premaxillae (nasals broader than premaxillae posteriorly in *P. s. spinatus*), the ends with a deep emargination between them; interorbital space narrower; mastoid and audital bullae smaller, dentition about as in *spinatus*.

*Measurements*.—*Type* (dry skin): Total length, 156 mm.; tail vertebrae, 80; hind foot, 20.7. An adult female topotype (dry skin), 158; 88; 20.7. *Skull* (type): Greatest length, 24.2; greatest mastoid breadth, 11.7; interorbital breadth, 5.6; length of nasals, 9.6; width of nasals (in front of incisors), 2.5; interparietal, 6.5 x 3; maxillary toothrow, 3.4.

*Remarks*.—While clearly a member of the *Perognathus spinatus* group this island pocket mouse differs so strongly from the widely ranging main, land animal that specific recognition appears warranted. Its small island habitat has been described by Mr. Joseph R. Slevin as rough and volcanic, and cut by steep, rocky canyons.

*Specimens examined*.—Two, both from the type locality.

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<sup>1</sup>Named for Dr. Barton W. Evermann in recognition of his active services as Director of the California Academy of Sciences, and as a systematic worker in furthering knowledge of the natural history of the peninsula of Lower California, and adjacent islands and waters.